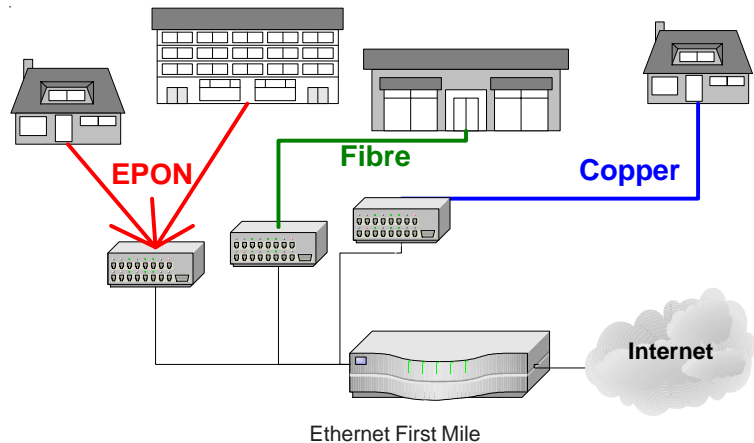




Optical Ethernet



Ethernet is a lower complexity solution than traditional telecoms (e.g. SONET) and it interfaces to end user equipment directly. It is now standardised at 10Mb/s, 100Mb/s, 1Gb/s and 10Gb/s.

Also offering reduced end to end complexity, Ethernet in the First Mile (EFM) is underway as an IEEE802 standards project. EFM promises to complete the 'Ethernet Everywhere' picture by embracing the access network.

What is Optical Ethernet?

Ethernet directly over fibre. The reduced end to end complexity can lead to faster payback for operators.

It is also designed to interface easily to the SONET packet format if required.

Three major versions were defined in IEEE 802.3ae:

Ethernet First Mile

EFM represents the missing link in achieving end to end Ethernet connectivity. In other words no translation of the packet is necessary between sender and receiver, and addressing is unified. Under discussion in the IEEE 802.3ah task force are point to point and passively split (EPON) optical solutions as well as point to point copper solutions. Furthermore, OAM (Operations Administration and Maintenance) is considered to be a major requirement for an EFM standard.

10GBase-R	LAN serial
10GBase-W	WAN serial
10GBase-X	WDM

For SONET WAN 'friendliness' a WAN Interface Sublayer (WIS) is included in 10GBase-W at 9.953Gb/s. 10GBase-X provides a coarse WDM solution with four channels of 3.125Gb/s. In addition, different reach variants are defined using SM, MM or parallel fibre and multimode or singlemode laser sources.

Single and dual fibre solutions are under discussion at 100Mb/s and 1Gb/s rates. The DSL style short copper solution will be around 10Mb/s and the long reach around 2Mb/s.

Industry Watch

Gigabit Ethernet is currently being deployed over tens of kilometres in private networks. A direct result of this is the need for multi-gigabit backbones for the trunked traffic, hence 10 gigabit Ethernet. Where native Ethernet cannot be used, the WAN version can be employed to match SONET OC-192c framing. Both serial forms of gigabit Ethernet use a reduced overhead 64B/66B line code.

10 Gigabit Ethernet

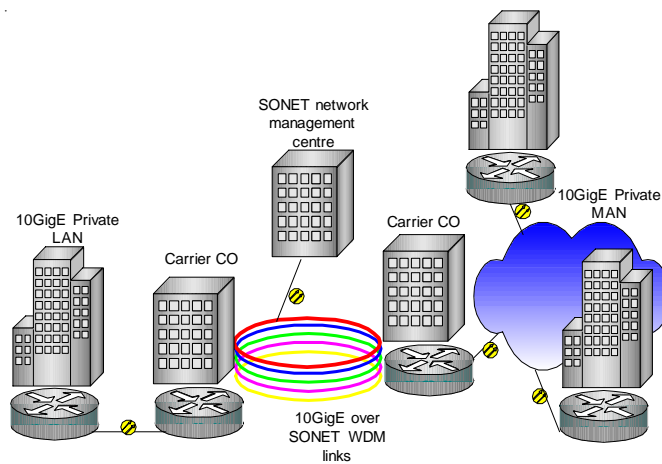
Unlike previous Ethernet speeds, 10Gb/s Ethernet (10GigE) is intended only for full duplex fibre environments.

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Consultants

Additionally, in shorter links, coarse WDM may be used to achieve 10Gb/s Ethernet throughput, but by using only 2.5Gb/s electronic interfaces. Such interfaces may use direct laser modulation, including VCSELs over links short enough for chirp not to be a problem. Such lower speed parallel interfaces mean the end user never has to deal with an electrical stream at 10Gb/s. Today's FPGAs are capable of 3.125 Gb/s LVDS inter-faces.



10 Gigabit Ethernet

Where an XFP packaging approach is used, it is necessary to track 10Gb/s over the PCB. Plextek are familiar with such techniques, including analog equalisation at this rate.

EFM uses many techniques which are familiar to Plextek from earlier 1000 Base-X work. Plextek is also familiar with the DSL approach for a copper solution.

Plextek Capabilities

Plextek design services cover the full life cycle of product development from initial strategic studies through to design for manufacture. Specific capabilities include:

- System Design
- PHY level power budget jitter budget dispersion budget
- Component Selection
- Detailed Design
- Standards Advice
- Design for Manufacture

Standards Experience

Plextek staff have actively attended ETSI, ATM and IEEE802 LAN/MAN standards committees and specifically take part in IEEE Standards Association sponsor ballots for the release of the latest standards, for example 802.3, 802.11, 802.12 and 802.16.

Bespoke Systems

Much of Plextek's work has traditionally also come from clients who want a custom non-standards approach to solving a problem. Plextek works with clients who need to interface to radical new devices or who require an innovative approach to complexity reduction.

Optoelectronics

Please see the separate Plextek information sheet on 'Optical Communications' which covers

- Transceivers
- CDR (clock and data recovery)
- EDFA control
- Laser wavelength tuning
- Integration techniques

Other experience

Plextek has a successful track record of product development in the communications market. Our 'Whole System' approach to product development can involve any of the following activities.

- Product concept and system specification
- Hardware and software design and integration
- Industrial design, mechanical and casework layout
- Type approvals testing
- Introduction into volume manufacture
- Development of factory test systems

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